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# China Report

## SCIENCE AND TECHNOLOGY

No. 128

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# CHINA REPORT

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APPLIED SCIENCES

## EQUIPMENT DESIGN MUST INCORPORATE EASE OF OPERATION

Tianjin GONGCHENG JIXIE [CONSTRUCTION MACHINERY AND EQUIPMENT] in Chinese No 6, 1981 pp 30-33

[Article by Xiong Jiayu [3574 1367 6877] of the Shanghai Electronics Technology School: "Mechanical Operating Devices Should Suit Man's Physiological Characteristics"]

[Text] Human operations are a sensory process. The worker senses the operation, movement, and changes of equipment via related displays of instruments, signals, or regular sounds and direct observation. Next, through the thought process he makes the correct judgment and decision, and then he uses the movement of his muscles to carry out the operation or to compare and correct the results of the operation. Finally he engages in controlling or regulating movements so that the equipment can operate normally according to its regulated movements. Therefore, controlling equipment is a sensory process of man's thoughts and muscular activity. Mechanical operating devices must operate normally and smoothly in coordination with the sensory process. This requires that the parameters of shape, size, weight, elasticity, inertia, and height of installation should be suited as much as possible to man's operating position, the relative position, and the direction of the application of force, thus enabling the operator to exert the most suitable amount of force and amount of motion and enabling him to control and regulate the equipment with a high degree of accuracy. We will give a brief description of man's physiological characteristics as related to the problems concerned.

### I. Height of Operating Installation

The average height of our nation's men is 1.67 meters and that of women is 1.56 meters. The height of the people of each region varies. People in Inner Mongolia, Shandong, and Hebei are taller—2 centimeters taller than the average. People in the middle and lower reaches of Changjiang, Shaanxi, Gansu, Xichuan, Fujian, Guangdong, and Guizhou are shorter. The height of entire operating installations should not be greater than the average height of people; generally, 1.8 meters is a good height. Installations lower than 1.3 meters should be set on a working table or on a support so that the total height will be about 1.8 meters. The width of the entire operating installation should be slightly wider than the distance between the two shoulders of the human body (generally 0.6 meters), but not more than 1 meter.

## II. Equipment and Vision

The wavelength of visible light seen by the human eye is 300 to 800 micromillimeters. The horizontal range of vision is 140° to 160°. The vertical range is from 50° above the horizontal line of vision to 80° below the horizontal line of vision, a total of about 130°. The visual angle of different colors is between 40° to 180°, as shown in the following table.

Visual Angles of Different Colors of the Human Eye (Degree)

| Color | White | Yellow | Blue | Red | Green |
|---|---|---|---|---|---|
| Direction | | | | | |
| Horizontal | 180 | 120 | 100 | 60 | 60 |
| Vertical | 130 | 95 | 80 | 45 | 40 |

The human eye is highly adaptive to variations of brightness and darkness. Walking from a bright place to a dark place, it can recognize a 0.03 lambert light spot; within 30 minutes, the human eye's light sensitivity will increase 15,000 times. Adaptation to brightness or weakness of light can be effectuated in 6 to 8 minutes.

The cones of the human eye contain three photosensitive chemicals that are sensitive to red, green, and blue. When the eye sees red, the red-sensitive chemicals break down and create the sensation of red. When the eye sees green, the green-sensitive chemicals decompose to create the sense of green. When red and green colors are seen simultaneously by the eye, the color-sensitive chemicals decompose according to a definite proportion to create the sense of yellow. If there is a deficiency of a given color-sensitive chemical, the person is colorblind. The human eye is most sensitive to the blue-green light of 510-micromillimeter wavelength during the daytime.

To adapt to the characteristics of the ability of the human eye to recognize colors and of the reaction speed, red usually is used for machinery and instruments with a color display to indicate positive voltage, prohibition from use, dangerous working conditions, emergency control devices, movements not allowed or incorrect... to indicate the limits which normal operating conditions should not exceed. Green indicates normal operating states, allowing operation, or allowing the use of certain controlling devices. White, milky white, and opaque colors indicate connection to power sources, preheated states, or preparation for startup and preparation for operation. Blue indicates negative voltage or indicates that the entire machine has operated its full cycle.

To increase the clarity and brightness of the indicators or the display signal, a yellow or orange color filter frequently is installed on the meter or the display.

To reduce the visual fatigue of the operator and to facilitate reading, the lighting is commonly covered by a shade to avoid having to see the light source directly, or the light source is placed behind a semitransparent meter. The brightness of the meter must be even, and the surface of the material of the meter should have no luster and should not reflect light. The contrast is greatest between the meter and its rim.

Automatic alarm indicators utilizing light signals must use colors different from those indicating normal operation. They are more outstanding and cause people to be alert. The light-emission frequency should be 3 to 10 times a second. The duration of light emission should not be shorter than 0.05 seconds.

Indicators should be set up at the most beneficial position on the horizontal line of vision. When the operator works in a standing position, the indicators should be 1.45 to 1.5 meters from the ground; when he is working in a seated position, they should be 1.1 to 1.2 meters from the ground. Installation of many indicators should be carried out according to the visual range of the human eye. The left and the right sides must not be over 0.35 meters from the eye, and the meters should be arranged symmetrically and in an orderly fashion as much as possible, and placed from left to right according to the operating procedures in order to facilitate the human eyes' moving from left to right.

Normal vision can differentiate between two straight lines or two dots with graduations 0.1 millimeters apart on the face of a meter placed 0.3 meters in front [of the eye]. Overly fine graduations will cause visual fatigue; therefore the distance between two lines of graduations is generally 2 to 4 millimeters apart. The height of the graduation lines must be larger than 1.5 millimeters, while the height of letters and numbers should be greater than 2 millimeters.

## III. Equipment and Hearing

The human ear can hear and differentiate mechanical vibrations between 16 and 20,000 hertz and can differentiate 1,500 types of different tones, 34 different sounds, and 325 different loudnesses. Not only is the human ear sensitive, but revival of hearing is also very quick--within 10 to 15 seconds.

The sound which the human ear can hear is called the hearing threshold. The sound that causes pain in the human ear is called the pain threshold. The interval between the hearing threshold and the pain threshold is 120 decibels. Sound varies from weak to strong, and decibel values vary from small to large. Generally in an environment of 30 to 40 decibels, an operator feels comfortable and calm. When it surpasses 50 to 60 decibels, one often loses concentration and begins to feel tired. When it is higher than 80 to 90 decibels, one feels uneasy and the noise interferes with normal operation. We can use sounds of some actual environments to explain the intensity of sound. For example, at night when it is quiet, the rustling sound of tree branches brushing against each other is about 20 decibels. Two persons murmuring make a sound of about 30 decibels. The sound in a technical design room or an office with six to eight persons is 40 to 50 decibels. In crowded streetcars or buses at the peak load period of passengers, the sound is about 70 to 80 decibels. In common machinery-manufacturing plants in our nation, the sound in a metallic processing shop is about 80 decibels, in an assembly shop it is about 90 decibels, in a punching shop it is about 100 decibels when using an air pick for cleaning castings, and when using an air hammer in forging, the sound reaches 110 decibels. The sound in an air compressor room sometimes reaches or surpasses 120 decibels. Figure 1 is the experimental curve of normal hearing of the human ear. The curve shows that the sense of hearing of the human ear is mainly related to the intensity of sound and the frequency of sound. The intensity of sound required to differentiate sound frequencies of 500 to 1,000 hertz is the smallest. But the duration of sound will also affect the ability to differentiate variations of sound intensity. The human ear normally hears sounds between 20 and 20,000 hertz in range of frequency; the differentiation is affected the most when a sound persists for 0.5 seconds or less. Later, hearing gradually adapts and the ability to differentiate drops. The drop in the ability of differentiation occurs more obviously at lower frequencies than at higher frequencies. When the sound intensity increases to about 120 decibels, a piercing sensation will be felt.

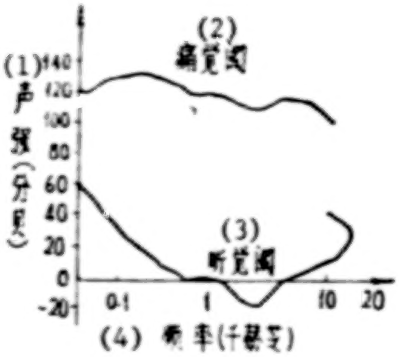

Figure 1 Range of hearing of the human ear

1. Sound intensity (decibels)
2. Pain threshold
3. Hearing threshold
4. Frequency (kilohertz)

The left ear and right ear hear differently, and the difference becomes greater as the frequency becomes higher. The human ear also varies in its ability to differentiate the direction of the source of sound. Generally it is easy to differentiate left and right directions and difficult to differentiate front and back directions. The source of a sound [whose origin] is not visible can be recognized by the human ear, but the accuracy is very low. Noise, such as screams, strange sounds, sounds of terror, sirens during air raids, and piercing sounds greater than 120 decibels, easily cause hearing fatigue in people and directly affect the emotions of the operator.

In a work environment, when visual observations are inconvenient, sounds of whistles, horns, or alarms of 1,000 hertz can be used as alarm indicators. The duration of the alarm should not be too long. The signal can be continuous or intermittent until repairmen arrive to shut the signal off.

## IV. Operation of Equipment and Exertion of Force by the Human Body

The amount of force exerted by the human body determines the position of application of force and the direction of force. Man applies force mainly by relying upon the movement of muscles. The muscles of the male that are distributed on the four limbs and shoulders and the back of the human body constitute about 42 percent of the muscles of the entire body, while the muscles of the female constitute about 36 percent. The hands moving in front of the human body can exert the greatest force. A bent arm can exert all of the force of the arm at a height of about 20° above horizontal. When the arm is higher than 45° above horizontal or when the arm is hanging down, only 35 percent of the force of the arm can be exerted. The amount of force which can be exerted at different positions is shown in Figure 2.

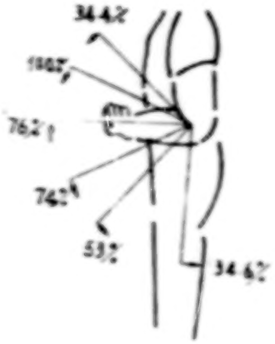

Figure 2

The operating device of a piece of equipment is most suitable when placed in front of the operator. When the operator is in a seated position, the force of pull toward the body is greater than when [he or she is] standing. The accuracy of application of force by the feet is similar to that of the hands. The strength varies according to the position of the feet. When [the legs are] stretched out straight, the force produced is greater than when the legs are bent. The greatest force is produced when there is a support. The application of force by the hands and feet is limited. Generally, the force controlled by the hands is not greater than 20 kilograms and the force controlled by the feet is not more than 30 kilograms; otherwise, the person becomes tired and his operating activity is affected.

The sensitivity of the human body to react to external stimuli is related to the duration of the stimuli and the skillfulness of operation. Within a definite degree, increasing the intensity of the stimuli upon the human body will lower the reaction time, but beyond this limiting value there will not be any effect. The operating motion can with repeated practice be shortened in time by 10 percent. The reaction time can also be shortened when there is a preparatory signal.

The reaction time of the human hand is shorter, and the right hand reacts more quickly than the left hand. The adaptability of the human hands to the external environment is slower than that of the feet. The hands and feet adapt easily to the senses of touch, pressure, temperature, and cold, but adaptability to pain is very slow. For example, when people wear clothes, they feel at first that their body is constricted, but after a very short time they adapt. When using warm water to wash the hands and feet, people feel the water is warm at first, but after several seconds they adapt. However, it is very difficult for the pain caused by a needle pricking the hand or feet to dissipate or for a person to adapt to it. During operation, constant physical contact with the operating device over a long period will cause fatigue and pain. Therefore, this should be prevented as much as possible.

The reaction speed of the human body slows as the person's age increases. Generally, human reactions are the sharpest between the ages of 25 and 45.

The reaction speed of the human hand is quicker in a horizontal position than in a vertical position. The right hand moves horizontally in a clockwise direction more conveniently than in a counterclockwise direction.

Equipment requiring a back-and-forth operation must take into consideration the fact that the time needed to realize the operating motion increases as the distance of the movement increases, but the time required to begin and terminate the motion is unrelated to the distance of the movement; it is a fixed and invariable numerical value.

In activities of operating with a load, the maximum speed of operation and the weight of the load being moved are inversely proportional, but the time required to achieve the maximum speed of the activity is directly proportional to the weight of the load.

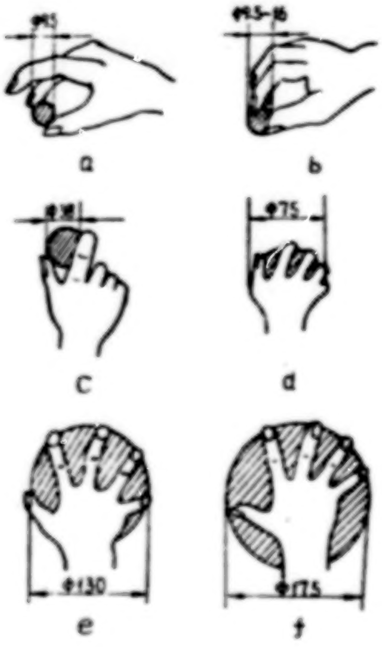

Figure 3

a. Operating with the thumb and middle finger
b. Operating with the thumb, index finger, and middle finger
c. Turning with the thumb and index finger
d. Five fingers operating the knob with the middle knuckles
e. Five fingers operating the knob with the fingertips
f. Five fingers operating the knob with the palm

Devices requiring the use of different parts of the fingers to operate, such as turning knobs, turning wheels, and round switches, must take into consideration the range of movement of the fingers in selecting the dimensions of the components. Figure 3 shows the appropriate dimensions of the components when using different parts of the fingers in operation.

Operations in cold regions must take into consideration the convenience of operation while one is wearing gloves, and the dimensions must be appropriately larger.

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AUTHOR: SHI Shisheng [2457 1102 0581]

ORG: Department of Civil Engineering, Qinghua University

TITLE: "Test and Plastic Analysis of Two-way Prestressed and Corner-supported Ribbed Slabs"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 2-12

TEXT OF ENGLISH ABSTRACT: The practical engineering of an experimental building of ribbed ceramsite concrete slab with filled hollows, which is two-way pressed and corner-supported, is studied in relation to plastic theory analysis in which the plates and ribs of the slab are taken for joint action in resisting bending, twisting moment and shearing force in the finite difference method program according to the elastic theory of plates. Plastic analysis of the above-mentioned structure system has been done very rarely so far. Based on the test and analysis, failure patterns of the slab are reported in this paper. It is found that the theoretical calculations by plastic theory agree with the test values, which will lead to a more reasonable and simplified way of calculation in practice. In addition, a comparison is made between yielding-line method and strip method analyses for the tested slab, which indicates that the latter is safer than the former.

AUTHOR: JIN Xueyi [6855 1331 2496]

ORG: Southwest Jiaotong University

TITLE: "Calculation of Railway Tunnel Non-curtained Ventilation"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 13-22

TEXT OF ENGLISH ABSTRACT: A study of blowing-in ventilation in a railway tunnel with no portal curtain device is presented and justified in this paper by model test data. Taking into consideration the skin friction at the intersection of the tunnel and the air duct, the calculation is formulated based on the momentum equation for evaluation of the air flow ratio of the tunnel proper to the air duct. Aided by the model test, the effect of the local vortices at the tee section is investigated, and it is believed that the method of determining the air flow ratio by the momentum equation is applicable to the location of the inlet not only near the tunnel portal, but anywhere else as well.

In addition, an investigation is also made on the ventilation efficiency and rational cross sectional area of the inlet according to the static pressure and the minor loss factor at the inlet of the test model.

AUTHOR: WANG Yisun [3769 6318 5549]
WANG Kecheng [3769 0668 2052]
HE Taiqiong [6320 0669 8825]

ORG: WANG Yisun of Hunan University; WANG Kecheng and HE both of the Hunan Computing Center

TITLE: "Vertical Vibration Analyses of Rectangular Foundation"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 23-34

TEXT OF ENGLISH ABSTRACT: The exact solution of the center displacement of a circle under uniformly distributed harmonic load on an elastic halfspace of arbitrary Poisson's ratio is given in this paper. The formulas for both the vertical displacement of the points outside and inside the base of a rectangular foundation and the average displacement of the foundation are presented. The results obtained from the relevant formulas are shown by charts and numerical tables, and are compared with those from other existing methods to verify the validity of the method presented in this paper. Finally, the determination of the parameters related to the lumped mass-spring-dashpot analog for rectangular foundation vibration is also discussed in brief.

AUTHOR: YIN Wanshou [3009 8001 1108]
ZHAO Suizhang [6392 3606 4545]
LIN Yinyue [2651 5593 1471]

ORG: All of the Large Bridge Engineering Bureau, Ministry of Railways

TITLE: "The Oscillation of Deep Water Floating Caissons during Construction"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 35-40

TEXT OF ENGLISH ABSTRACT: During the construction of the two floating caissons of a bridge across the Changjiang River in China, an abnormal late autumn flood damaged the side anchoring cable system and set the floating system in a dangerous lateral oscillation. This paper presents a detailed description of the fault, the cause of the oscillation, and the method of restoring the system control, as well as some related discussions.

AUTHOR: FAN Lichu [5400 4539 4342]

ORG: Tongji University

TITLE: "Nonlinear Earthquake Response Analysis of Beam Bridge"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 41-52

TEXT OF ENGLISH ABSTRACT: According to the analytical results of a field dynamics test of the new Luan River bridge, the simplified mechanical model for calculating the earthquake response of the beam bridge structure is established with lumped masses and an equivalent soil-spring system. This system is modeled after the resisting force of soil layers under the ground.. Taking into account the $\beta$ parameters (from the Newmark-$\beta$ method) and $\theta$ (from the Wilson-$\theta$ method), an improved numerical analysis procedure is derived in this paper, and a complete program is thus developed.

A sketch of the old Luan River bridge structure after the earthquake disaster is given, and the break mechanism of this structure and some related problems in the analysis are also discussed.

AUTHOR: SHI Yanwen [0670 1750 2429]

ORG: Northwest Water Conservancy Research Institute, Ministry of Water Conservancy

TITLE: "A Study of Maximum Density of Large-sized Sandy Gravels"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 53-58

TEXT OF ENGLISH ABSTRACT: The author has deduced an ideal linear equation relating the maximum density of sandy gravels under vibration to the similar gradation modulus, and has extrapolated the maximum density of large-sized prototype sandy gravels. The deduced maximum density of the sandy gravels has been compared with the results of field measurements. Thus, on overcoming the difficulty in test techniques of large-sized materials, a new method of determining the optimum density of coarse-grained embankment materials is introduced which provides a scientific basis for analyzing the stability of high earth rock-filled dams.

AUTHOR: XIONG Dunshi [3574 2415 1102]
WANG Taijun [3076 3141 6874]
HE Shuyan [0149 2885 1693]
HE Kanghui [0149 1660 1920]

ORG: All of the Nuclear Energy Technology Research Institute, Qinghua University

TITLE: "Elastic Analysis of Prestressed Concrete Pressure Vessels by Three-dimensional Isoparametric Finite Element Method"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 59-69

TEXT OF ENGLISH ABSTRACT: Taking into consideration the effect of the liner, reinforcing bar and prestressed reinforcement, the elastic solution of PCPV's by the isoparametric finite element method is discussed in this paper. Requirements for shape function to meet convergence criteria and isoparametric transformation are studied together with the general method for establishing the shape function of different elements. Formulas are derived in respect to the contribution of the effect of the liner and reinforcement to the stiffness matrix of a three-dimensional body element. Peculiarities of the computer program, CHFEM, for the analysis of the three-dimensional isoparametric element are briefly described. Finally, through practical example, a comparison is made between the calculated values and those measured.

AUTHOR: ZHANG Shiduo [1728 1102 6995]

ORG: Tongji University

TITLE: "On the Calculation of Cracking of Reinforced Concrete Beams under Long-term and Repeated Loadings"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 70-82

TEXT OF ENGLISH ABSTRACT: Many semi-theoretical and experimental expressions are now available for computing the crack interval and its maximum opening on reinforced concrete beams under short-term loadings. After summarizing the cracks and their origins, the author tries to discuss some points concerning the crack expressions listed in China's current specifications on highway bridges. Based on the above discussion, the author proposes expressions for evaluation of crack width and beam intervals under long-term and repeated loadings in which the four parameters are analyzed and estimated according to available experimental data from various researchers. Finally, the test data from British, Chinese and Soviet researchers and 12 years of site observations from Yongjiang bridge, Guangxi Autonomous Region, are used to examine the proposed crack formulas for practicality.

AUTHOR: MEI Yaokun [2734 1031 0981]

ORG: Guangdong Academy of Architectural Design

TITLE: "Analysis of Temperature Stresses in Circular Concrete Arches"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1981 pp 83-97

TEXT OF ENGLISH ABSTRACT: In the structural mechanics method currently used for analysis of temperature stresses in circular concrete arch bridges, certain factors affecting these stresses are neglected for the sake of simplification of calculation, and, therefore, the outcome is approximate and generally the error may exceed the allowable limit. Furthermore, the method is limited in application for cases of constant temperature field.

Based on the theory of elasticity, a set of fundamental differential equations are formulated in this paper to solve the temperature stresses and deformations of circular arches under conditions of constant and variable temperature fields respectively. When compared with the results obtained by the current method, the method presented here offers wider applicability and better accuracy, and, in addition, the formulas are rather simple.

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AUTHOR: XU Guozong [7312 0948 1350]

ORG: Shanghai Research Institute of Metallurgy

TITLE: "Characteristics and Application of EPROM Made in China"

SOURCE: Beijing DIANZI KEXUE JISHU [SCIENCE AND TECHNOLOGY OF ELECTRONICS] in Chinese No 8, 81 pp 15-18

ABSTRACT: EPROM [Erasable Programmable Read-Only Memory] is a type of PROM that is capable of being electrically reprogrammed repeatedly. With the development of microcomputers, EPROM has a wide range of applications. China has now successfully made 2 types of 2K and 8K EPROM; they are now officially in production. They have the following characteristics: (1) A special input device using the form of electrical pulses is used to reprogram; (2) The data thus written into the EPROM may be preserved for many years; (3) Irradiation with ultraviolet light is all that is needed to revise [erase] the contents of the EPROM; (4) The TTL circuit is convenient for both output and input; (5) The multi-digit output structure has a storage capacity of W x 8 places; (6) The address access time is less than 450ns. The basic theory of information storage, characteristics of the 2K EPROM and the 8K EPROM, the method of erasing the information, the structure of the program input device, and some major applications of the 2 types of EPROM are introduced.

AUTHOR: HUANG Shizhong [7806 6624 0022]
YIN Guangji [3009 1684 3444]

ORG: None

TITLE: "Establishment of a Joint Computer Software Center Ratified by Both Governments of China and Japan"

SOURCE: Beijing DIANZI KEXUE JISHU [SCIENCE AND TECHNOLOGY OF ELECTRONICS] in Chinese No 8, 81 p 48

ABSTRACT: The China Computer Technology Service Company, which is a part of the State's Bureau of Electronic Computer Industry reached an agreement and signed a formal contract with the NEC Company of Japan to establish, jointly, a Sino-Japanese Computer Software Center in Beijing, which will involve technical cooperation of the two countries in the realm of computer science. This cooperation will have a positive effect in promoting the development of softwares in China. The negotiation was prompted by QIAN MIN 6929 2404] the Minister of the Fourth Ministry of Machines and XIAO-LIN Hongzhi [transliteration] head of the NEC Company of Japan under the spirit of mutual cooperation. The proposed center will be managed by a committee, composed of 6 representatives, three from each country. The software center will train Chinese personnel for business management, systems engineering, programming, computer application extension, development and application of softwares, etc. and will also serve as a center of user service and training as well as equipment maintenance. The cooperative establishment of this center has aroused attention and interest among related circles here and abroad. It is certain that the center will contribute to the development of friendship and science and technology of both countries.

AUTHOR: JIAO Zhongyi [3542 0112 0034]

ORG: None

TITLE: "The Production Line of Flyback Transformer Imported by Beijing Television Component Plant No 3 Has Begun to Operate"

SOURCE: Beijing DIANZI KEXUE JISHU [SCIENCE AND TECHNOLOGY OF ELECTRONICS] in Chinese No 8, 81 p 48

ABSTRACT: For the development of a television industry and under the unified arrangement of the State's Planning Committee, the Beijing Television Component Plant No 3 imported from the Shengli [Sony] Company of Japan the equipment for producing the flyback transformer [horizontal output transformer] used in color television. The equipment has a design capacity of producing 500,000 such transformers a year. The contract for this equipment was signed in Dec 79. The coordinating accessories began to be designed in China in Mar 80. The equipment and all related installation were completed in Dec 80. On 1 Feb 81, the test operation began. The rate of qualified products was calculated to be 97.7 percent. Under the condition of an environmental temperature of 45°C and a relative humidity of 95 percent, the equipment operated continuously without interruption for half a month while sample products were being taken. The operation was found to be normal. The safety characteristics were found to meet UL and CSA standards. The technical properties of the products were rated first in China and were found to possess the condition to enter international markets. A ribbon cutting ceremoney was performed to mark the official opening of the Plant on 15 Apr 81.

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CSO: 4009/466

## Geography

AUTHOR: WANG Nailiang [3769 0035 2733]
YANG Jingchun [2799 2529 2504]

ORG: Both of the Department of Geography, Beijing University

TITLE: "Neotectonics Study in China--Review and Prospects"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 135-142

TEXT OF ENGLISH ABSTRACT: Neotectonic movements are very active in China, but before liberation they were only occasionally noticed by scholars. It was only after liberation, when the study of neotectonics was integrated with construction works, that it progressed quickly. The chief achievements in this field of study are as follows: 1) Research on relations between neotectonics and the evolution of landforms; 2) Investigations of active faults and folds; 3) Inquiry into the relations between neotectonics and deep-seated structures in the earth's crust; 4) Research on the stress field of neotectonics; 5) Study of the relations between neotectonics and earthquakes; 6) Application of new techniques and methods to the study of neotectonics.

Hereafter the study of neotectonics in China will have the following trends: 1) The study will proceed from the shallower part of the earth's crust to the deeper part, resulting in better elucidating the neotectonic phenomena and the origin of mega-structural landforms; 2) The study will extend from Plio-Pleistocene

[Continuation of DILI XUEBAO No 2, 1981 pp 135-142]

to Holocene time spans; 3) The application of new techniques and methods will be much enhanced, so as to transform the nature of study from qualitative to quantitative; 4) More attention will be paid to the study of horizontal movements in addition to vertical movements; 5) A more widespread monitoring of active faults will be undertaken, which will lead to prediction of future fault activities; 6) The study of the history of neotectonic movements will also be enhanced; 7) A more comprehensive study of the Quaternary tectonic stress field will be launched.

AUTHOR: QIAN Ning [6929 1380]
ZHANG Ren [1728 0088]
LI Jiufa [2621 0046 7569]
HU Weide [5170 4850 1795]

ORG: QIAN and ZHANG both of the Department of Hydraulic Engineering, Qinghua University; LI of the Estuarine and Coastal Research Institute, Huadong Normal University; HU of the Fifth Bureau of Construction, Ministry of Water Conservancy

TITLE: "A Preliminary Study of the Mechanism of Self Regulation of Sediment Transport Capacity in the Lower Huanghe (Yellow River)"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 143-156

TEXT OF ENGLISH ABSTRACT: In rivers with heavy sediment load, the river channel will adjust itself temporarily in accordance with the variations in sediment concentration and composition for each flood. When the amount of sediment coming from upstream increased, the result of self adjustment is in the direction of increasing the sediment transport capacity such that the outgoing load from the reach will also be increased. This is the so-called "the more it comes, the more it goes," which is well known in the Lower Huanghe.

In this article the modified Einstein Bed-load Function is used as a tool for studying the mechanism of short-period adjustment in rivers with high concentrations.

[Continuation of DILI XUEBAO No 2, 1981 pp 143-156]

The results of analysis indicate that for the Hua-Yuan-Kou reach of the Lower Huanghe, the channel bed is usually silted up for a high oncoming load, yet the concentration is smaller than 400 kg per $m^3$. As a consequence, the bed composition will become finer, and it is essentially through this process that the sediment transport capacity is raised. However, when the oncoming load surpasses 400 kg per $m^3$, the channel will instead be deeply eroded. In this case, the change in physical properties of the flow due to the presence of high sediment concentration and the adjustment in channel shape are the two major factors in raising the sediment transport capacity.

AUTHOR: ZHANG Wenchang [1728 2429 0863]

ORG: Institute of Geography, Chinese Academy of Sciences

TITLE: "Some Problems in the Allocation of Transport in Industrial Bases"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 157-170

TEXT OF ENGLISH ABSTRACT: Because of their various conditions and specializations, different kinds of industrial bases have different types of inter-regional and intra-regional economic links and thus have different requirements for a transport network.

The author analyzes four kinds of industrial bases:
(1) Inter-regional raw material or fuel base. It is characterized by the much larger tonnage of exports than imports, e.g., Shanxi coal base, with coal tonnage making up 80 percent of the provincial freight of the railroad, and export tonnage three times more than import tonnage.
(2) Industrial base with developed manufacturing industries depending on supply of raw materials and fuels from outside, e.g., Shanghai, with import tonnage twice as much as export tonnage.
(3) Complex industrial base depending on local resources. Its import, export and intra-regional tonnage is usually large, e.g., Liaoning Province. Its railroad freight accounts for 13 percent of that of all of China, with more than 70 percent

[Continuation of DILI XUEBAO No 2, 1981 pp 157-170]

of it being intra-regional.
(4) Industrial base with mainly intra-regional links, e.g., Sichuan Province. Because of its particular geographical conditions, Sichuan has weak economic links with the outside, and nearly 90 percent of its total freight is intra-regional.

With the development of the industrial base, its orientation and characteristics of economic links are always changing. For example, Liaoning Province has experienced three stages, i.e., 1) largely exporting raw materials and fuels, 2) developing primary industries dependent on local resources, 3) necessarily importing considerable amounts of raw materials and fuels. In all these stages, allocation of transportation lines has been required to develop accordingly.

Any large industrial base needs construction of a transport network. Through analysis of case studies in China, the author argues that the distance of trunk lines (railroad and river) should be no less than 120 km.

The author gives several examples to explain that transport construction (including lines, stations, ports, etc.) must be undertaken in advance of the regional development and construction of industrial bases.

AUTHOR: LI Shoushen [2621 1108 3234]

ORG: Department of Geography, Beijing University

TITLE: "Some Problems Related to Mapping the Land Types in the Mountainous Region (Based on Studies of the Mountainous Region West of Beijing"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 171-179

TEXT OF ENGLISH ABSTRACT: The procedure of mapping the land types in mountainous regions is quite different from that in the plains. In mountainous regions, mapping needs to begin with studying the basic morphological features of the mountains. These include the vertical zonation, alternation of positive and negative landforms, aspects of slopes, etc. In addition, the formation of the morphological features of land units should also be analyzed.

While making large- and middle-scale maps of the land types of the mountainous region west of Beijing, two facts have been noticed. One fact is that the latitudinal position and altitude of the mountain determine the spectrum of vertical zones and its structure. The other is that the geological and geomorphological factors (geological structure, new tectonic movement, lithology, types of landforms, etc.) have important relationships to the differentiation of the land units and their structural characteristics. They also form the basis for different agricultural uses. Therefore, these two facts have to be studied carefully in order to

[Continuation of DILI XUEBAO No 2, 1981 pp 171-179]

give a sound foundation to mapping.

Several related problems should be studied further. They are:
1. The hierarchy of the classification of land units. We think that the hierarchy should be "the vertical zones of mountain landscape, land system, facet and elements." Such a hierarchy not only agrees with the characteristics of the mountainous region, but also is useful in making comparisons with the land types of the plains.
2. The basic contents of maps of different scales. Considering the characteristics of the mountainous region and the present agricultural land use conditions, we suggest that: (1) for large-scale mapping, the land facet should be the main object; (2) for middle-scale mapping, the land system should be the main object; and (3) for small-scale mapping, the vertical zone of natural landscape should be the main object. As for the land elements, it does not seem feasible to map these.
3. Legend design and nomenclature. Legend design and nomenclature should reflect the comprehensive character of the land. Both the sequent legend and the two-row or multi-row index legend can be used. Each has its advantages and shortcomings. However, in compiling the land type maps of the whole country, it is convenient to use the sequent legend.
4. The synthesis of the land type maps. We have attempted to synthesize the land type maps according to the regional principle and the type principle. This involves the shape and boundary of the mapping units, the unification and adjustment of the legend symbols, etc. All these problems need to be studied further.

AUTHOR: WANG Mingyuan [3769 2494 6678]
ZHANG Shen [4545 3747]

ORG: Both of the Department of Chemical Geography, Institute of Geography, Chinese Academy of Sciences

TITLE: "Characteristics of Chemical Geography in Regions of Kaschin-Beck's Disease"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 180-186

TEXT OF ENGLISH ABSTRACT: Kaschin-Beck's disease is a non-communicable endemic that is distributed widely in China. This study indicates that the chemical geography in the disease-occurring regions is characterized by a lower content of sulfur and selenium and a high content of strontium in the drinking water, soil and grain as compared with healthy regions. The geographical epidemicity of this disease may be controlled by a high content of sulfur and selenium in the environment. This disease can also be prevented and cured to a certain extent by chemical compounds containing sulfur. As the cause of this disease is not yet completely known, the relationship between this disease and some trace elements related to sulfur in the field of biogeochemistry should be further studied.

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AUTHOR: GUO Qiyun [6753 0366 5619]
WANG Jiqin [3769 4949 3830]

ORG: Both of the Institute of Geography, Chinese Academy of Sciences

TITLE: "Interannual Variations of Rain Spell during Predominant Summer Monsoon over China for the Past 30 Years"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 187-195

TEXT OF ENGLISH ABSTRACT: 1) By using the normal decade rainfall data for eastern China an analysis of the seasonal change of rainfall is made. The investigation shows that the maximum rainfall zone usually stagnates for some days in south China when moving from south to north, doing so in the Changjiang Basin and north China also. These three periods of stagnation coincide roughly with the time interval of the predominant monsoon in the above-mentioned regions. However, in the Changjiang Basin the length of the stagnating period was much shorter than that of the other two regions, with a slight movement of the maximum rainfall zone observed.

2) The rain spells for south China, the Changjiang Basin and north China were determined by using the pentad rainfall data year by year from 1951 to 1979. The beginning and ending dates, intermissions and persistence of the rain spells were obtained. The rainfall total for each rain spell was also calculated. It is found that the characteristics of rain spells varied obviously from one year to

[Continuation of DILI XUEBAO No 2, 1981 pp 187-195]

another. The beginning dates of rain spells experienced the biggest interannual variations, especially in south China. The variations of rain spells of one region rarely correlated with those of another.

3) An analysis of long period rain spell variations shows that the trend was more predominant in the Changjiang Basin. In general, the beginning of the rain spell was earlier, the duration was longer and the total rainfall was more in the 1950's in the Changjiang Basin and south China. On the other hand, the beginning of the rain spell was later, its length shorter, and the total rainfall was smaller in the Changjiang Basin in the 1960's. At the same time, the beginning of the rain spell was earlier and it persisted longer, although the total rainfall did not increase much, in north China. In the 1970's, in both south and north China the rain spells started later and also ended later. In the last decade the total rainfall at the Changjiang Basin has been between those of the 1950's and 1960's.

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AUTHOR: CUI Qiwu [1508 0796 2976]
ZHU Jinwei [2612 0513 0251]

ORG: Both of the Institute of Forestry and Pedology, Chinese Academy of Sciences

TITLE: "The Transmissive and Reflective Theoretics of Light for Various Structures of the Forest Canopy"

SOURCE: Beijing DILI XUEBAO [ACTA GEOGRAPHICA SINICA] in Chinese No 2, 1981 pp 196-208

EXCERPTS FROM ENGLISH ABSTRACT: In this paper the theoretical distributions of direct and diffuse light in the forest canopy are described. The relative light under the forest canopy is calculated as a function of the leaf area index, sun elevation and characteristic angle of the leaves. Light reflections in the forest canopy are computed in a system with horizontal leaves and vertical leaves. The results obtained are discussed.

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AUTHOR: LIN Zhiguang [2651 0037 0342]

ORG: None

TITLE: "Characteristics of Rainstorm Weather in China"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 7, Jul 81 pp 4-6

ABSTRACT: On 5-7 Aug 1975, a heavy rainstorm occurred in the hilly region of the upper reaches of Huaihe in central south Henan Province. A total of 1603 mm of rain fell in the period of 3 days over some counties, such as Linzhuang and in an overall area of 19,410 $km^2$, the rainfall of the 3 days exceeded 400 mm everywhere. Historically, a similar rainstorm is reported in records of local counties in 1593, amounting to once in 400 years. Rainstorms of such a magnitude occurring in Hebei (1963) Shaanxi (1977) the Yangzi Valley (1931, 1954, 1980) and Taiwan (1963, 1967) are briefly described. Due to the fact that rainstorms need vapor which in China is almost always supplied by the low latitude sea of the south, generally speaking there are more rainstorms in South China than North China, more along the coastal region than the inland areas. Rainstorms in China also have the characteristic of being concentrated in the summer monsoon season. Finally, the paper analyzes the relationship between rainstorms and topography. As a rule; therefore, they are rare in the arid Northwest and Qinghai-Xizang Plateau because of the relatively low humidity and minimal vapor supply in these regions.

AUTHOR: LI Changwen [2621 2490 2429]

ORG: None

TITLE: "Will the Region of the Vicinity of the Tropic of Cancer in China Turn Into a Desert?"

SOURCE: Beijing DILI ZHISHI [GEOGRAPHICAL KNOWLEDGE] in Chinese No 7, Jul 81 pp 8-9

ABSTRACT: It has been claimed by some that due to the destruction of forests in Xishuangbanna of Yunnan Province, which is located in the "Tropic desert zone" the region will turn into a desert in 7-8 years, or no more than several decades. Some rather famous scientists went so far as to claim that the Dinghushan monsoon evergreen forest will become an oasis, locating exactly on the eastern end of this desert zone. The author argues against this viewpoint. In his opinion, although many famous deserts of the world are distributed in the vicinity of the Tropic of Cancer or the Tropic of Capricorn, aridity and lack of rainfall remain the necessary condition for desert formation. The special natural geographic condition of the region of the Tropic of Cancer in China, influenced primarily by the Qinghai-Xizang Plateau and the nearby oceans, provides it with a climate different from other regions of the same latitude in other countries; therefore, there is no worry of its turning into a desert. The harmonious water and heat relationship and abundance of rainfall in that region of China provide the destroyed forests a sufficiently high natural ability of renewal and rate of growth for fast recovery. After the policy of cropping

[continuation of DILI ZHISHI No 7, 1981 pp 8-9]

discontinuance was implemented in 1964 in Yunnan, the artificially seeded and naturally renewed forests have grown larger every year. At present, the destroyed and barren mountains have reached 80 percent of vegetative coverage. In Baisha County of Hainan Island, the forests that were selectively logged in 1970-71 have all grown back. Trees of some dominant species now measure about 107 cm in diameter.

6248
CSO: 4009/467

AUTHOR: HONG Yuanzhang

ORG: Yongkang Tractor Factory

TITLE: "Investigation of the 10,000 Hour Endurance Test for the Crankshaft of Model S195 Diesel Engine"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 1-8

TEXT OF ENGLISH ABSTRACT: In this paper, the results of a 10,000 hour endurance test for the nitempered crankshaft of model S195 diesel engine are described. The results show that both the outside compound layer and the inside nitrided diffusion zone possess good wearability. Therefore, in order to prolong the service life of the nitempered crankshaft, not only the surface condition of the thinner compound layer but also the property of a thicker nitrided diffusion zone with higher concentration of nitrogen should be studied.

AUTHOR: SHEN Li [3947 3810]
LI Fenlun [2621 5358 0243]

ORG: Both of Qinghua University

TITLE: "Study of the Measuring Equipment for Bosch Injection Rate"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 9-15

TEXT OF ENGLISH ABSTRACT: Measuring equipment with no back pressure for the Bosch injection rate has been designed and operated. The reliability of its results has also been investigated.

After studying the correlation of the injection rate, fuel pressure in the pipe and the needle valve lift and analyzing the amplitude of the first reflecting wave, we are ready to compare the results obtained by this equipment with those obtained by the rotating cells method and the ordinary Bosch method.

In this paper, the proposed criterion for the design of measuring equipment for the Bosch injection rate is that under the condition of no back pressure, the orifice chosen should be small enough to make the amplitude of the first reflecting wave slightly greater than that of the original one (or four waves present in the oscillogram).

AUTHOR: YUN Zhang'an [1926 3864 1344]

ORG: Zhenjiang Institute of Agricultural Machinery

TITLE: "Discussion of Thermal Load Analysis in the Cylinder Head of a Diesel Engine"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 16-21

TEXT OF ENGLISH ABSTRACT: Through temperature measurement it is found that the maximum thermal load is in the bridge zone between valve seats of the cylinder head. On this basis, the traditional viewpoint of analyzing the heat transfer of water cooling surfaces by the single-phase convection method may be discarded, while the mechanism of boiling heat transfer for analyzing the cooling effect of the cylinder head in a diesel engine is recommended emphatically in this paper. The cause of the thermal crack of the "bridge" is found to be scale formation and insufficient flow of cooling water, which is verified by the practical running of an engine.

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AUTHOR: HU Xuefan [5170 7185 1581]
YAO Shulin [1202 3219 2651]
LIU Zhibang [0491 3112 6721]

ORG: All of the Shanghai Marine Diesel Engine Research Institute

TITLE: "An Investigation of the Turbocharging System with a Pulse Converter"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 22-30

TEXT OF ENGLISH ABSTRACT: This paper presents the calculating method of a pulse converter. In case of a lack of experimental data, the effect of the pulse converter on pressure waves in the exhaust manifold may be analyzed by means of the physical model and calculating method as described.

In addition, some problems concerning the performance of the pulse converter in a turbocharging system are briefly discussed. As far as turbocharged model 8300 diesel engine is concerned, it is found that the calculating results agree well with the pressure wave patterns and the data obtained by measurement.

AUTHOR: WENG Like [5040 4539 0344]

ORG: Shanghai Diesel Engine Works

TITLE: "Design Method of the Function Cam Profile Used in an Injection Pump"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 31-44

TEXT OF ENGLISH ABSTRACT: Through analyzing the movement of a cam-roller mechanism, this paper illustrates the design method of effective injection and descending sectors on the function cam of an injection pump and, in addition, the design method of a circular arc cam as well as the criterion for selecting basic parameters of both types of cam are also described. The function cam designed by the method mentioned in this paper has been used satisfactorily.

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AUTHOR: SHI Huilan [2457 5610 5695]

ORG: Dalian Diesel Locomotive Research Institute

TITLE: "Design of the Parabolic Profile Compressor Inducer of a Turbocharger and Calculation of Its Coordinates Used in Machining by a Numerical Control Miller"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 45-54

TEXT OF ENGLISH ABSTRACT: This paper presents the calculating equations for designing a turbocharger compressor inducer with parabolic profile of arbitrary exponent, and the method of calculation by an electronic computer of its four-dimensional coordinates used in machining by a numerical control miller according to the loci of the cutter.

Due to the actual profile of the inducer machined being in disagreement with the designing requirement, the machining method of the inducer by a five-dimensional numerical control miller is to be investigated.

AUTHOR: SHEN Zujing [3088 4371 0079]

ORG: Qinghua University

TITLE: "The Data Processing and Comparability of Steady Air Flow Tests in Inlet Ports of an IC Engine"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 55-63

TEXT OF ENGLISH ABSTRACT: The flow parameters within the cylinder and at the inlet port are measured in steady air flow tests of an IC engine. The data processing and comparability of the tests have been investigated for the following two aspects:

1. Based on the theory of similarity, the air flow characteristics expressed by several non-dimensional parameters are analyzed and generalized.
2. Referring to the experimental results, the air swirl measurement by a vane meter, which represents as accurately as possible the practical angular momentum flux, is to be discussed.

Finally, the standard equipment and data processing method are proposed to facilitate comparison of the data of engine inlet port tests.

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AUTHOR: HUANG Zhigang [7806 5267 0474]
YANG Renfa [2799 0088 4099]
ZHOU Weixin [0719 4850 2450]
QIU Genmao [6726 2704 5399]
et al.

ORG: All of the Shanghai Internal Combustion Engine Research Institute

TITLE: "Discussion of Light-duty Biogas-Diesel Dual Fuel Engine"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 64-70

TEXT OF ENGLISH ABSTRACT: Biogas is a kind of energy resource which has been comprehensively utilized in rural China due to its cheapness and availability. It is used in engines to save liquid fuel and to economically provide power and electricity in agriculture.

In this paper, the modification and operation principles of model S195 biogas engine and its governing mechanism are discussed. Together with some experimental results, these may be used as reference material in the work of converting diesel engines into dual fuel versions.

AUTHOR: LIN Gen [2651 0065]

ORG: Shanghai Internal Combustion Engine Research Institute

TITLE: "Development of Model CDX Digital Display Device for Hydraulic Dynamometer"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 71-77

TEXT OF ENGLISH ABSTRACT: The model CDX digital display device is an application of digital encoding and decoding techniques which converts the readings of a hydraulic dynamometer accurately into the digital display, providing not only the power indicator for the console, but also the signals which are necessary for load feedback and data processing in automatization of engine testing.

AUTHOR: XIANG Songnian [7309 2646 1628]

ORG: China Spring Factory

TITLE: "High Frequency Fatigue Machine for Valve Spring of Internal Combustion Engine"

SOURCE: Shanghai NEIRANJI GONGCHENG [CHINESE INTERNAL COMBUSTION ENGINE ENGINEERING] in Chinese No 2, 1981 pp 78-83

TEXT OF ENGLISH ABSTRACT: In this paper, the construction and principle of a resonant type spring fatigue machine are so described that its design criterion can be derived. In addition, the working principle of its electric driving circuit is summarized.

9717
CSO: 4009/406

AUTHOR: LI Yangguo [2621 2254 0948]
LIU Yuan [0491 3220]
CHEN Shengzhong [7115 3932 1813]

ORG: All of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "High Energy $\alpha-\alpha$ Elastic Scattering"

SOURCE: Beijing YUANZI HEWULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 3 No 3, Aug 81 pp 213-216, 206

TEXT OF ENGLISH ABSTRACT: Since the $\alpha$ particle has no spin and its isospin is equal to zero, the study of $\alpha-\alpha$ elastic scattering at high energy might play an important role in the research on nucleus-nucleus collision. In this paper, based on two different approximations (the rigid projectile approximation and the optical limit approximation), the amplitudes for high energy $\alpha-\alpha$ elastic scattering are given with an explicit feature of making numerical calculation easily. In detail calculation, the modified mass center correction is adopted for the optical limit case. The calculated results for both approximations agree with the experiment as well as the exact ones do.

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AUTHOR: TAO Zhenlan [7118 2182 5695]
ZHU Fuying [2612 4395 5391]
QIU Huiyuan [5941 1920 3293]
et al.

ORG: All of the Institute of Nuclear Research, Chinese Academy of Sciences

TITLE: "The Excitation Functions for the Reaction $^{182-186}$W(d, 2n)$^{182-186}$Re and $^{186}$W(d, p)$^{187}$W"

SOURCE: Beijing YUANZI HEWULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 3 No 3, Aug 81 pp 242-248, 241

TEXT OF ENGLISH ABSTRACT: By means of the high-resolution Ge(Li) $\gamma$-ray detector and on-line $\gamma$ spectrum analysis technology, the excitation functions for the reactions $^{182-186}$W(d, 2n)$^{182-186}$Re, $^{186}$W(d, p)$^{187}$W were measured for deuteron energies from about 7 to 15.7 MeV with natural tungsten. The data were compared with the calculations of the compound nuclear evaporation theory.

AUTHOR: FANG Jinqing [2455 6930 3237]

ORG: Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "Numerical Simulation of the Ion Optics of Intense Current Ion Beams Extracted from a Plasma"

SOURCE: Beijing YUANZI HEWULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese Vol 3 No 3, Aug 81 pp 267-277, 260

TEXT OF ENGLISH ABSTRACT: At the present time the ion optics of intense current ion beams is of particular interest to many fields of modern science and technology. In this paper, we have studied extraction of the intense current ion beams from a plasma in the calutron ion source and the subsequent acceleration of these beams by means of a combination of electrostatic and magnetic fields. This problem requires the simultaneous solution of: (1) the nonlinear Poisson's equation; (2) the non-relativistic equation of motion of ions; (3) the continuity of ion current.

In this paper we present a physical model and a convergent two-dimensional numerical method of simulation by a digital electron computer for planar axisymmetric ion beams in the calutron ion source. The physical model is based on the theory of the plasma-sheath which could provide a simple physical picture and can be used to calculate physical properties of the plasma emitter. The computer program is

[Continuation of YUANZI HEWULI Vol 3 No 3, Aug 81 pp 267-277, 260]

developed. The iteration scheme includes three iteration loops. It starts with the ions on the plasma emitter (i.e., the equi-potential surface in the plasma) and includes space charge of electron from the plasma which penetrates this emitter. The program can select the self-consistent shape and position of the plasma emitter, and can calculate space potential distribution, ion trajectories and distribution of space charge density.

Finally, some ion optical results of the calutron ion source are given, and are compared with the results of experiments. However, the method is not limited to the calutron ion source. The program is shown to provide a stable solution, and therefore should be useful for many situations. We are still continuing to study a variety of problems of ion optics of intense current ion beams.

9717
CSO: 4009/459

AUTHOR: ZHANG Wanxuan [1728 8001 6693]

ORG: East China Petroleum College

TITLE: "On Classification of Petroleum Pools and the Types of Petroleum Pools in China"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 3, 1981 pp 1-11

TEXT OF ENGLISH ABSTRACT: A sound classification of petroleum pools must be scientific and practical: scientific in the sense that the classification is based on the trap forming elements and can reflect the differences and relationship between the traps, and practical in the sense that the classification is simple and clear enough to serve as a guide for oil and gas exploration.

Based on the above two criteria, the author proposes to divide the petroleum traps broadly into two basic types: structural and stratigraphic. Based on their specific origin and apparent features, structural pools are further classified into four sub-groups: anticlinal pools and pools caused by faulting, fracturing and piercement folding. Stratigraphic pools are subdivided into lithologic, stratigraphic nonconformity, stratigraphic overlap and bioherm pools.

The main types of oil pools in China are examined in the examples and also in the conclusion.

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AUTHOR: XIE Gongjian [6200 1872 0313]

ORG: Exploration and Development Research Institute, Yumeng Petroleum Administration

TITLE: "Occurrence of the Oil Pool in the Metamorphosed Basement in Yaerxia in the Western Part of the Jiuquan Basin"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 3, 1981 pp 23-30

TEXT OF ENGLISH ABSTRACT: The oil pool in the metamorphosed basement in Yaerxia was discovered in 1959. Its reservoir rock is composed of an interbed of slightly metamorphosed grayish-green and purple sandstone and Silurian arenaceous shale. Oil accumulations lie in the neighborhood of faults or at the intersection of faults and on the anticlinal axis where fractures are well developed. The overburden consists of sections in Silurian with no fractures and mudstones of Cretaceous and Tertiary.

Crude oil comes from the lower Xinmingbao group of Cretaceous in the Qingsi depression, with properties similar to those of other pools in the western part of the Jiuquan basin--paraffin-naphthenic hydrocarbons.

On the plain, the oil pool is distributed like a sheet, and in the vertical section it is divided into multiple zones. Simultaneous with the study of the area covered

[Continuation of SHIYOU XUEBAO Vol 2 No 3, 1981 pp 23-30]

by the oil pool, efforts should be directed toward finding out the lower depth limit of the pool so as to discover more reserves.

AUTHOR: LU Minggang [0719 7686 1511]

ORG: Scientific Research Institute of Petroleum Exploration and Development, Beijing

TITLE: "Source of Oil for the Western Part of the Tarimu Basin"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 3, 1981 pp 31-36

TEXT OF ENGLISH ABSTRACT: There are five sets of source rocks in the western part of the Tarimu Basin, the Jurassic being a set of practical value, with abundant organic materials of very good properties and with appropriate maturity. The Cretaceous-Lower Tertiary series is a good prospect, although the conditions for oil generation along the basin margin are not so favorable. It is a marine deposit controlled by faults. Source rocks of considerable thickness supposedly exist in the Kashi-Yecheng and Awati-Luntai depressions.

Crude oils are classified into four types according to their properties. The oils from north Bancheng and Wuqia are characteristic of continental origin, with spectra of isoprenoids similar to those for the Jurassic source rocks. They originated from the Jurassic source rocks. The oils from Kuche and south Yecheng have a low pristane/phytane ratio and their vanadium/nickel ratio is greater than 1, and with the discovery of two pieces of algae fossil they are identified as of marine origin. The carbon isotopes from the crude oil are quite like those in the

[Continuation of SHIYOU XUEBAO Vol 2 No 3, 1981 pp 31-36]

Cretaceous-Lower Tertiary source rocks, so they are most probably from the Cretaceous-Lower Tertiary source rocks.

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AUTHOR: WANG Ping [3769 1627]

ORG: Geological Research Institute, Shengli Oil Field

TITLE: "Occurrence of Oil in the Complex Fault Blocks in the Jiyang Sag"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 3, 1981 pp 37-43

TEXT OF ENGLISH ABSTRACT: There are many complex fault block oil pools in the Jiyang sag in the northern part of Shandong Province. They resulted from intensive block-faulting of an inherited nature during the main period of oil accumulations which caused remigration of oil and gas that finally formed into pools. Evidently, these pools are controlled by fault blocks which are separated from each other by major faults of an inherited nature. Each fault block may contain several minor blocks with similar reservoir characteristics, but wide differences are apparent between the different fault blocks.

AUTHOR: TANG Zengxiong [0781 2582 3574]

ORG: Daqing Oil Field

TITLE: "A Field Pilot Test to Demonstrate the Whole Process of Water Flooding in the Daqing Oil Field"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 3, 1981 pp 45-53

TEXT OF ENGLISH ABSTRACT: In order to get acquainted with the characteristics and changes of production by water flooding and to make predictions about its sweep efficiency, a field pilot test was conducted in 1965 in the Daqing Oil Field on a close-spaced well pattern. The results of the test have been proved to be reliable by means of numerical simulation and core analysis. They are summarized as follows:
1. Lower recovery-bbl/psi drop when the water cut is less than 60 percent. A steady output may be maintained if the reduction of the difference between bottom hole pressure and saturation pressure is gradual;
2. Flowing production is suitable when the water cut is less than 60∼70 percent; when the water cut exceeds this limit, other means of production should be chosen on the basis of techno-economic analysis; and
3. The recovery factor by water drive in the Daqing Oil Field is 40 percent, the increase in water cut is rather rapid and the period of production with water cut is quite long.

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AUTHOR: YIN Ding [1438 1353]
SUN Yueming [1327 2588 2494]

ORG: Both of the Exploration and Development Research Institute, North China Oil Field

TITLE: "Rational Rate of Recovery and Well Density in the Development of Carbonate Pools in Renqiu"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 3, 1981 pp 55-62

TEXT OF ENGLISH ABSTRACT: Rational development of a carbonate pool must be preceded by a serious study of such basic problems as the rate of recovery, well density, etc. Based on the analysis of production statistics from the Renqiu Oil Field and the numerical simulation of a water cone, a comparative study is made of the results of development with different rates of recovery and different well densities.
It is obvious that to prolong the period of production without water-cut is critical to improving the efficiency of development of carbonate oil pool, because the appearance of water in a well means the end of its steady high-yielding period. However, the choice of a rational rate of recovery is all the more important for both prolonging the period of production without water-cut and increasing the recovery factor. To ensure steady production of an oil field in line with some specific target, the rate of recovery should be so chosen as to cause a gradual

[Continuation of SHIYOU XUEBAO Vol 2 No 3, 1981 pp 55-62]

rise of bottom water, a uniform upward movement of oil-water interface and a higher efficiency of driving oil through the rock pores.

The result of our study reveals that the rational rate of recovery for the Renqiu Oil Field should be less than 2 percent. Given a specific rate of recovery, different well densities for the different stages of development will give different results. For the Renqiu Oil Field, the rational well density is 0.75 - 1 well per square km. Starting from the geological features in Renqiu and after comparing the results of exploitation of wells with different heights of oil columns, it is proposed that the wells be located in areas where the height of the oil column is equal to or greater than the average thickness of the reservoir.

9717
CSO: 4009/456

AUTHOR: LIAO Shaobao [1675 1421 5508]

ORG: Institute of Electrical Engineering, Chinese Academy of Sciences

TITLE: "Conceptual Design of Solar Energy Community"

SOURCE: Beijing TAIYANGNENG XUEBAO [ACTA ENERGIAE SOLARIS SINICA] in Chinese Vol 2 No 3, Jul 81 pp 236-246

TEXT OF ENGLISH ABSTRACT: This paper describes the concept of the Solar Energy Community (SEC), and adds a new significance to the original meaning of Total Energy System. The conceptual design of the SEC is made. Through an analysis comparing several forms of natural energy in rural areas, such as solar thermal, wind, biogas and small hydroelectric, it is considered that the research and development of SEC is of great importance in the search for solving the power supply problem in the countryside.

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AUTHOR: SUN Guochao [1327 0948 2600]
LIAN Liwen [6647 7787 2429]
ZHOU Shaoying [0719 4801 5391]
et al.

ORG: All of the Chengdu Institute of Biology, Chinese Academy of Sciences

TITLE: "An Approach to Increasing the Biogas Yield of a Rural Biogas Digester"

SOURCE: Beijing TAIYANGNENG XUEBAO [ACTA ENERGIAE SOLARIS SINICA] in Chinese Vol 2 No 3, Jul 81 pp 247-251

TEXT OF ENGLISH ABSTRACT: Adding 0.3 percent $(NH_4)_2HCO_3$ to rotted straw can advance the biogas yield of a rural biogas digester significantly during the anaerobic digestion process. When compared with rotted straw to which pig and cow manure was added, the biogas yield could increase 100 percent. For barren nitrogen in the rural biogas digester, $(NH_4)_2HCO_3$ can replace human and animal wastes to obtain a higher efficiency of biogas production. When 3 kg of $(NH_4)_2HCO_3$ per cubic meter rotted straw is added, the digester can produce 14.1 $m^3$ biogas. The fertility of $(NH_4)_2HCO_3$ can be conserved and result in organic fertilizer which can be combined with inorganic fertilizer.

9717
CSO: 4009/455

AUTHOR: SHI Guangyan [4258 0342 1484]
WANG Zhengrong [3769 2973 2837]

ORG: Both of Anhui Provincial Research Institute of Transportation Science

TITLE: "Test Run of a Hovercraft in Chaohu"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese Vol 3 No 8, 16 Aug 81 p 9

ABSTRACT: With the help of such organizations as the Shanghai Ship Research Institute of the Ministry of Transportation, the Chaohu Shipbuilding Plant and the Anhui Provincial Research Institute of Transportation Science have successfully made China's first air-cushion vessel for local inland navigation. Repeated test runs performed most recently in Chaohu have proved that its various navigation properties meet the design requirements. It is entirely of glass fiber reinforced plastic and propelled by a single engine to a speed of 40 km per hour. It has a capacity of 40 passengers. The cabin is equipped with light and soft chairs and has a good view. Naturally, people worry about the waves and mist caused by a hovercraft such as this and the problems it may cause in inland navigation. In reality, the existing power boats stir up stronger waves as their displacement and speed are increased. The waves of an air-cushion vessel are different; they disappear soon after it passes, even through a narrow channel, due to its minimal draught; these waves have no effect on embankments or nearby small boats. There is a drawing depicting the interior view of the hovercraft and a photo taken during the test run is on the back cover.

AUTHOR: YAN Yan [0917 1484]

ORG: None

TITLE: "Clouds--Bomb"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese Vol 3 No 8, 16 Aug 81 pp 16-17

ABSTRACT: This paper reports that in the 1950's the USA devoted a great deal of efforts to study the problem of stable burning of the liquid fuel of rockets and found the condition for converting unstable burning to explosion. The success of this research resolved the problem of reliability of large liquid fuel rocket engines and at the same time discovered the gas-liquid (fuel mist) two-phase explosion condition. The possibility of controlling and realizing fuel mist explosion began. The U.S. Navy was the first to make the FAE (fuel air explosive) in 1960. In 1967, the U.S. Navy used epoxy ethane to sweep minefields for the first time. The CBU-55 fuel air explosive was tested in 1969-1970, again by the U.S. Navy. Special characteristics of the CBU-55, different from any other explosives or bombs, are briefly discussed.

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CSO: 4009/469

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